AMENDED CLAIMS

1. (Currently Amended) A method of treating a liquid stream which contains impurities in limited amounts with a solid adsorbent having an affinity for the impurities compared with other components in the liquid to reduce the impurities for the adsorber-treated product with the following steps:

providing a liquid fresh feedstream to an adsorber, the liquid fresh feedstream being effectively cooled and effectively free from agents which might degrade the impurity removal performance after long term regeneration;

providing a porous, particulate adsorbent within a 8 to 45 Tyler mesh range and in a narrow fraction such that excessive size segregation or excessive top to bottom mixing does not occur when subject to fluidization with bed expansions no greater than 10 percent with the liquid feedstream or liquid effluent from preceding adsorption stages;

providing an adsorption section consisting of liquid fluidized stages with a bottom inlet and an upper outlet in at least one adsorber vessel;

introducing an adsorbent stream as a cooled slurry into the upper part of a last adsorption stage to countercurrent contact the said liquid stream that flows upward from a preceding adsorption stage until the said adsorbent leaves as spent adsorbent and the said liquid fresh feedstream enters the fresh feed entry adsorption stage;

withdrawing spent adsorbent continuously as a slurry near an inlet distributor of the fresh feed adsorption stage to proceed to a liquid-solid separator that separates liquid forming the slurry for return as liquid to the fresh feed entry adsorption stage, whereas the solids separated enter a regeneration section that has at least two desorption zones and a cool-down zone for the regeneration of the spent adsorbent stream;

providing the regeneration section with two or more desorption zones which first continuously desorb a portion of the desired liquid product initially in spent adsorbent pores at successively higher temperatures in the respective desorption zones, by recirculating gas after cooling and condensing most of the liquid released in the respective desorption zones, with impurity concentration of condensed liquid from the first desorption zone being significantly lower than that of the fresh feed; inlet gas is heated in the respective desorption zones to accomplish desorption; with said heated gas

to the first desorption zone being heated to a higher temperature than the solids leaving the first desorption zone or liquid recycle zone but ~~significantly~~ lower in temperature than that used for heated gas that enters the final desorption zone which removes the impurities from the solids;

~~as a concentrated impurity stream;~~

recirculating the desired liquid condensed from the first desorpton zone effluent to the latter stages of the adsorber section for certain feedstocks to increase the yield and quality of the product leaving the adsorber;

providing sufficient makeup gas to the first desorption zone to ensure gas phase and provide for the solution loss in the condensed liquid as well as some flow to the final desorption zone;

cooling and condensing the gas leaving the final desorption zone to produce a concentrated liquid impurity stream while the gas is recirculated after treatment for removal of impurities as a reactivating gas to the cool-down zone of the regenerator;

introducing a reactivating gas effectively free from any agents from any agents that might interfere with the desired adsorption of impurities with total makeup gas sufficient to ensure gas phase and other regenerator section losses with ~~usually only~~ a fraction of the gas entering to accomplish cool-down of the adsorbent solids leaving the final desorption zone with gas cross flow contact using a plurality of countercurrent contacts to hot regenerated adsorbent solids leaving the final desorption zone ~~impurity stage~~ downwardly flowing for transfer of heat to the reactivating gas leaving the cool-down zone of the regenerator section;

causing said heated gas exiting from said cool-down zone to enter a heater for heating to the required temperature to accomplish ~~sufficiently~~ the desorption of impurities in the final desorption zone on a once through basis with neglible impurities entering in the gas to the said cool-down zone;

providing a regenerated adsorbent stream from said cool-down zone with cooling to remove the heat of wetting with a liquid and further cool the slurry before introducing into the adsorber section; and

recirculating the cooled regenerated adsorbent stream for introduction into the terminal adsorption stage of the adsorption section.

2. (Currently Amended) The method of treating as set forth in claim 1, wherein 96 weight percent or greater of the particulate adsorbents are spherical, greater than 16 Tyler mesh, ~~and from~~

~~the14 to 35 Tyler Mesh range but~~ with a particle diameter range ratio less than 1.6.~~of about 1.5~~.

3. (Canceled)

4. (Cancelled)

5. (Currently amended) The method of treating as set forth in claim1 wherein the liquid feed enters an adsorber vessel at less than 20 degrees centigrade. ~~feed stream is a liquid hydrocarbon feed ranging from 3 to 15 in carbon numbers and the feed entering is not greater than 40 degrees centigrade.~~

6. (Currently amended) The method of treating as set forth in claim 1 ,wherein the liquid feed stream is a liquid hydrocarbon feed using principally hydrogen for makeup gases to the regenerator with the final desorption zone effluent gas leaving to enter a vapor phase reactor for the hydrogenation of most of the entering heteroatoms with heat exchange and cooling following to condense a hydrogenated liquid product with the gas recycled to the cool-down zone of the regenerator after removal of hydrogen sulfide. ~~ranging from 3 to 15 in carbon numbers with a hydrogen containing gas to enter a vapor phase reactor for the hydrogenation of most of the entering heteroatoms with the resultant reetor vapor effluent being condensed with cooling to enter a separator wherein the hydrogenated heteroatom concentrated liquid is further separated.~~

7. (Cancelled)

8. (Cancelled) .

9. (Cancelled) .

10. (Cancelled) .

11. (Cancelled).

12. (Currently amended) The method of treating as set forth in claim 1, wherein the liquid stream is a hydrocarbon feed with the effluent vapors from the final desorption zone of the regeneration section being heat exchanged and cooled to produce a reduced volume of concentrated heteroatom liquid economically being suited to biological ~~ly desulfurized~~ desulfurization.

13. (Cancelled)

14. (Previously presented) The method of treating as set forth in claim 1, wherein a limited amount of reactivating gas makeup is used with a hydrogen containing gas entering as gas makeup to the first desorption zone of the regenerator, while nitrogen or other gas enters as reactivating gas

makeup to the cool-down zone of the regenerator.

15. (Currently Amended) The method of treating as set forth in claim 1, wherein total reactivating gas makeup is ~~about~~ less than 5 percent of the gas entering the cool-down zone of the regenerator..

16. (Currently amended) The method of treating as set forth in claim 1, wherein the adsorber section comprises a limited number of fluidized stages by limiting the bed expansion in the fluidized zones of the adsorption section with settled bed height ,preferentially increasing in ascending order from ~~less than seven meter settled bed height in~~ the feed entry adsorption stage to ~~and~~ less than thirty meter settled bed height in the final adsorption stage.

17. (Previously presented) The method of treating as set forth in claim 1, wherein the adsorption section comprises more than one adsorption vessel and the method comprises using part of the liquid adsorption stream from a preceding adsorption vessel closer to the fresh feed as a liquid lift for the withdrawn slurry from the succeeding vessel to reduce the pumping head required for the major part of the liquid adsorption stream that enters as feed to the succeeding vessel.

18. (Previously presented) The method of treating as set forth in claim 1, wherein the method further comprises using an enlarged diameter section at the top of an adsorber to facilitate separation of the solids from the liquid while reducing the height for a given bed inventory in the upper stages of an adsorption vessel for permitting lift liquid to be used or liquid to be injected in the upper stages without any increase in superficial velocity for the liquid in the fluidized beds below the enlarged diameter section.

19. (Cancelled) .

20. (Currently amended) The method of treating as set forth in claim 1, wherein the method comprises using screened, smaller diameter adsorbent solids normally discarded long term from the regenerator to prevent excessive fines in the adsorber section as a filtering medium for the fresh feed to be treated liqiud to remove ~~ensure removal of~~ scale, poisons and other debris from contaminating the circulating adsorbent used.

21. (Currently amended) The method of treating as set forth in claim 1, wherein for a ~~the~~ liquid ~~stream is a~~ hydrocarbon feed ~~and~~ the method comprises removing corrosive agents including mercaptans to a level below 0.5 ppmw for the adsorber treated product.

22. (Previously presented) The method of treating as set forth in claim 1, wherein the liquid stream is a dirty liquid stream such as from a coker or gasoline visbreaker, and the method comprises producing a clear water-white product, free from any noxious odors as the adsorber treated product.

23. (Currently amended) The method of treating as set forth in claim 1, wherein for ~~the liquid stream is~~ a liquid hydrocarbon feed ~~and~~ the method comprises removing nitrogen compounds to less than 0.3 ppmw nitrogen in the adsorber treated product.

24. (Previously presented) The method of treating as set forth in claim 1, comprising a step of gravity transfer between stages of the adsorption vessel using a device for interface fluid-solid level detection for the solids containing bed in a stage and control of the solids transfer by varying the opening using a valve in the conduit from the bed distributor of the upper stage that contains openings smaller than the fluidized particles which permit liquid effluent from the stage below to enter the succeeding stage.

25. (Previously presented) The method of treating as set forth in claim 24, wherein the slurry conduit enters about the normal expanded solids bed height of the succeeding lower stage.

26.(Original) The method of treating as set forth in claim 24, wherein the differential for transfer of solids is provided by slurry density in the conduit versus clear liquid density available below the upper stage distributor.

27. (Original) The method of treating as set forth in claim 26, wherein the slurry conduit is located outside the adsorption vessel so that external access to the transfer valve is facilitated and interference with even, smooth distribution of the liquid entering the distributor above is minimal.

28. (Currently Amended) The method of treating as set forth in claim 1, wherein gravity transfers the solids in a continuous manner with a thin, cross-flow bed less than a ~~about 0.5~~ meter in thickness for gas cross-flow with baffling on the gas side and with controlled gas flow rates for gas cross-flow in the various desorption zones of the regenerator to minimize the residence of solid particles subject to temperatures that may cause carbonaceous carbonation deposits to form on the adsorbent while avoiding readsorption due to colder temperature of the particles at the gas outlet caused by excessive ~~increased~~ bed flow lengths.

29. (Cancelled )

30. (Cancelled)

31. (Canceled)